Name:

at1117paper: Complete the Square (v303)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 28 feet. Their combined area, found by adding the square's area and the rectangle's area, is 380 square feet. What is the value of x?

Example's Solution

$$x^2 + 28x = 380$$

To complete the square, add $\left(\frac{28}{2}\right)^2 = 196$ to both sides.

$$x^2 + 28x + 196 = 576$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 14)^2 = 576$$

Undo the squaring.

$$x + 14 = \pm\sqrt{576}$$

$$x + 14 = \pm 24$$

Subtract 14 from both sides.

$$x = -14 \pm 24$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 10$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 46 feet. The total area, of the square and rectangle, is 1407 square feet. What is the value of x?

$$x^2 + 46x = 1407$$

$$x^2 + 46x + 529 = 1936$$

$$(x + 23)^2 = 1936$$

$$x + 23 = \pm 44$$

$$x = 21$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 60 feet. The total area, of the square and rectangle, is 1036 square feet. What is the value of x?

$$x^2 + 60x = 1036$$
$$x^2 + 60x + 900 = 1936$$
$$(x + 30)^2 = 1936$$
$$x + 30 = \pm 44$$
$$x = 14$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 52 feet. The total area, of the square and rectangle, is 1824 square feet. What is the value of x?

$$x^2 + 52x = 1824$$
$$x^2 + 52x + 676 = 2500$$
$$(x + 26)^2 = 2500$$
$$x + 26 = \pm 50$$
$$x = 24$$